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Cacti Cultivation Instructions

Complete Information on
propagation from seeds, cuttings
and grafting.

Courtesy of Phillip Hambly
owner/WOH

\$10.00

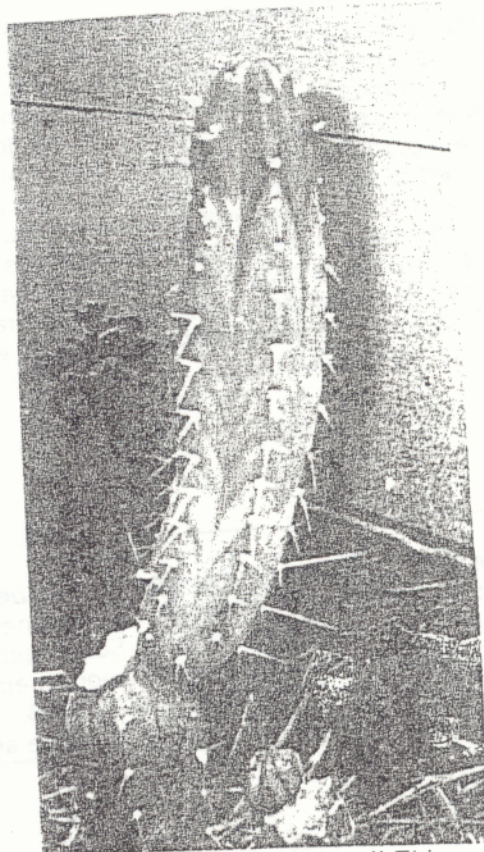
Cacti Cultivation From Cuttings by Anonymous

Growing cacti from cuttings is easy and exciting. If one were to merely place a cutting in sand or vermiculite, and keep it lightly moist for 2 to 6 months, there is a high chance it would root. However, here's a technique for eliminating risk of failure. Lophophora varieties easily root from cuttings using the guidelines below. They can also be grafted (see Cactus Grafting Report) to a faster growing cactus, such as Trichocereus, thereby increasing growth as much as ten times. Almost any size Trichocereus cutting can be rooted. The technique for rooting a very small specimen, say one inch tall by 1/8 inch in diameter, is the same as for a large three foot tall by three inch in diameter plant. If you are attempting a cutting smaller than four or five inches tall or less than three inches in diameter, it's best to use one with a tip. However, if the specimen is larger than this, no tip is needed.

Cut the specimen you want to root off the mature cactus with a sharp knife. Place it in a moderately cool and dry location, so that the base will form a dry scab at least 1/8 inch deep. The location must be shaded. The process usually takes 3-4 weeks. Once it has formed a scab, make two or three clean punctures with a sharp blade about one inch above the base. These openings will enable the cuttings to absorb small amounts of nourishment while it is developing roots. Then dip the entire base in rooting powder up to 1/2 inch deep. Establish it in a container of pure sand or vermiculite. A small container is best because this will allow the rooting medium to dry back quickly between waterings, making the danger of root rot less likely. If you wish, you can take a section without a tip and bury one half of it horizontally, following the same steps outlined above. This cutting will eventually root and form columnar heads from both ends.

It is important to use sand or vermiculite as a rooting medium. The use of soil can cause the cutting to rot before it roots. This is because soil contains high levels of bacteria. If you are attempting to root cuttings in cool weather, vermiculite (also called rock wool) is the best medium. It holds warmth, which increases biological activity. Cuttings can root within four weeks during the winter using vermiculite, provided they're placed in a warm sunny window. Most Trichocereus cacti are cold hardy to 20 degrees F, and cuttings to 30 degrees F. If rooting is to begin when weather is hot, sand is best because it will keep the cuttings cool. Allow the sand or vermiculite to dry back to about 1/8 inch above the base of the cuttings between waterings.

After four weeks check to see if the cutting has begun rooting. This can be done by holding the cactus and container horizontally and gently pulling them apart. If rooting has not occurred, place it back in the container and check again every two weeks. It can take up to six months, or longer, for a cutting to root. So be patient. The most important thing is to keep them warm throughout the entire process, while at the same time employing low exposure to direct sunlight.



Trichocereus bridgesii: This cacti, along with *T. pachanoi*, was known by the Incas as San Pedro the sacred visionary cactuses.

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In the winter months you can usually just place your cuttings in a sunny window. This is because the sun's rays are less intense during these months. However in the warmer seasons, it is best to monitor sunlight to two to four hours of direct light daily, depending on the light intensity. The inexperienced person is best advised to place the cuttings in direct light which has been shaded with a commercial grade shade cloth every day until rooted. This method works very well in spring and summer when it is warm enough to place them outdoors. It also works well in a warm winter greenhouse. Cuttings will often root within two weeks during spring through early fall.

Once you have determined that the cutting has rooted, reestablish it in a container or soil type suitable for ideal growing. Sand and vermiculite contain almost no soluble plant nutrients, and should be considered a rooting medium only. Most commercially available cactus soil is suitable for growing. You can produce your own high quality growing soil for pennies per gallon (see Growing Lophophora and Trichocereus Cactus From Seeds). Levels of around 7.0 pH are most desirable. However, wonderful results have been achieved with a pH of 8.0 as well. The most important factor is to have a rich loamus/sand soil mix (50/50), as can be found under mountain trees of the southwest. Limestone, or any other liming compound is suggested if pH levels are below 6.5. If fresh loamus soil can't be found, you can compost leaves and pine needles into a naturally superior loam. Whatever loam source used, mix in 33% to 50% sand for cactus planting, especially for Trichocereus.

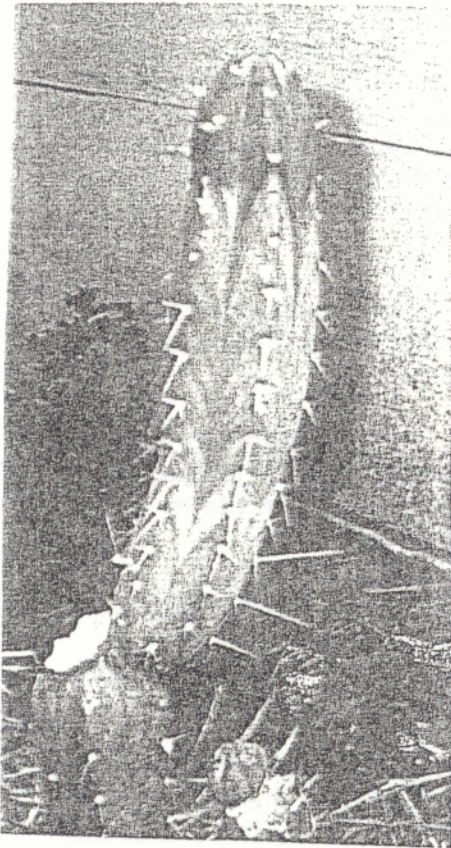
After you've established your rooted cuttings in sandy loam soil, you need to prepare it to thrive in direct sunlight for optimum growth. This process is called "hardening off". Since you have had your plants in shade only for two to six months, they can't be exposed to long hours of direct light, or they will die of sun stroke. This is especially true if your plants became rooted in the late spring through summer. Start by locating the cuttings where they will receive only two to three hours of direct light daily (DLD) for a period of five to seven days. Then graduate them to four to five hours DLD. After a time at this level, the DLD can be increased to six or seven hours. After a couple weeks, you could allow them even more DLD. However, most cacti will grow best receiving only partial sun (four to seven hours DLD). This is especially true with Trichocereus varieties. If the plants are located in full sun (eight to twelve hours daily), they will continue to grow, but more slowly than in partial sun, and very regular waterings will be needed for faster growth and good appearance. Once you've mastered all these steps, enjoy your well deserved feelings of joy and pride in your accomplishment.

The Peyote Way Church of God grants its members legal freedom to cultivate peyote, under the Constitutional Freedom of Religion Amendment, as a religious sacrament. Membership is granted regardless of race or religion. Some restrictions may apply, depending on the status of membership. For more information about membership, write to: The Peyote Way Church of God, Star Rt. 1, Box 7X, Klondyke, AZ 85643. It's best when requesting information from them to send a SASE or \$2.00 to cover postage and other costs.

Cactus Grafting Report by Anonymous

LOPHOPHORA WILLIAMISII TO TRICHOCEREUS CANDICANS AS A RAPID PROPAGATION TECHNIQUE

It is desirable to use a host plant such as T. Candicans for grafting purposes to accelerate growth patterns for cactus such as Lophophora Williamisii. T. Candicans is preferred as a host plant over San Pedro or others for the following reasons: (1.) Candicans is a smaller plant with a smaller root system and more button grafts may be accomplished in a far smaller space. (2.) Candicans plants do well in medium sized pots for many years and the entire collection can be lightweight and portable. (3.) The respective diameters of the two plants are more closely matched for easier grafting.



Trichocereus bridgesii: This cacti, along with *T. pachanoi*, was known by the Incas as San Pedro the sacred visionary cactuses.

Once a single button of L.W. is grafted to a limb of T.C., it will undergo phenomenal growth. New L.W. heads will grow out of the side areoles of the primary grafted head. Once these side growing "pups" reach the size needed to match the limb diameter of a T.C., these may be cut off and grafted to a new limb. Since the growth energy of the host plant is blocked and terminated with a button head, the formation of a new limb from the base of the plant usually happens quickly. As soon as this new limb reaches sufficient height and diameter, one of the pups may be cut off and grafted onto the end of this limb. The goal is to constantly keep blocking any vertical growth of the T.C. limbs. This accomplishes two things: (1.) More rapid forced growth of the button grafts and the formation of three or more side pups at the areole points is achieved. (2.) Rapid formation of new limbs for new grafts using these pups are also created. The T.C. attempts to bypass the energy blocking grafts by forming new limbs. After the formation of a new limb, three inches or more may be cut off the top of it. This limb is now ready to receive a graft.

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Once a graft has "taken" and button growth is evident, any T.C. limb with a button previously grafted to it may be severed several inches or more below the button and set aside in a warm shady spot for two weeks so that the wound may have time to callous up. Then this same limb may be placed in a pot. The T.C. will develop new roots and the whole process begins over again. From a single button head grafted onto a single T.C. limb, the system will take off at an exponential rate. Starting with only a few buttons of L.W., within a few years these could turn into a hundred.

GRAFTING TECHNIQUES

Cut a button off as straight and flat as possible with a brand new carton knife blade (available at hardware stores) and do the same to a T. Candicans limb. Position the cuts on each plant so that the diameters of the cuts are equal or that the button cut is slightly smaller in diameter. Put them together and weight the top of the button with a small piece of rock slate. If this is not enough weight to firmly press the button down, add another rock to the top of the slate. Experimentation and practice will eventually get it right. Let them stay like this for at least 7 days, after which the rocks may be removed. The graft may not actually "take" (where you can see signs of growth) for another 2-3 weeks.

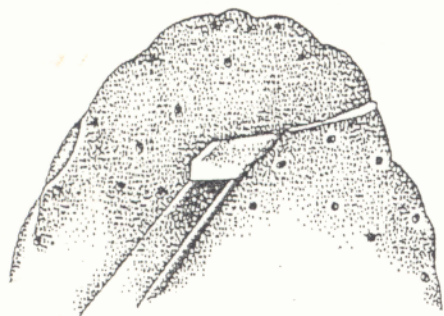
Even poorly done grafts with only one half or less of the surfaces attached have been seen to work. These take longer to become established, but once the connection is made, they will take off as well as the others.

Once a person gets the hang of it, it is very easy. A single graft can be done in under 5 minutes. Buttons grown in this manner can be expected to increase in diameter at the approximate rate of one inch per year, not to mention the multiple side pups which are also growing at the same phenomenal rate!

All plants should be shaded. A white bed sheet stapled to a lightweight wood frame works well. This allows them to get plenty of light for growth without burning them. They love intense heat (80 to 100 degrees). It is at this time that growth is most spectacular.

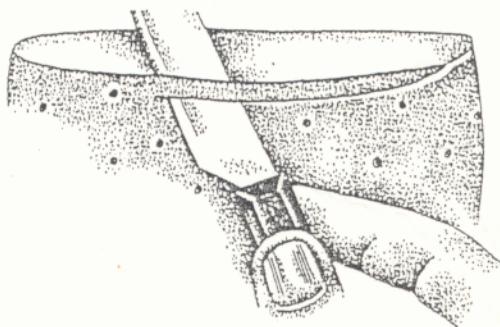
They will flower for most of the summer if they are regularly watered. To insure pollination, touch the pistils and stamens from one flower to the next with a soft tipped brush. You will be rewarded with many hundred seeds by the end of the summer. Two or three weeks after the flower has gone, a tiny red fruit bearing seeds will appear. Pick this out with tweezers, making sure to remove the entire fruit at the base. The seeds may be planted (see "Growing Lophophora and Trichocereus Cactus From Seeds") or make excellent gifts. The plants generally begin flowering when they are two inches in diameter or greater.

STEP BY STEP GRAFTING

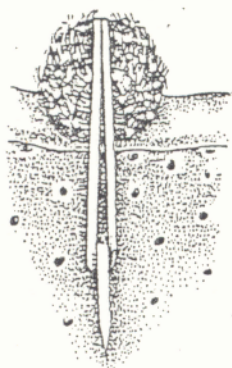


USING AN OPUNTIA PAD

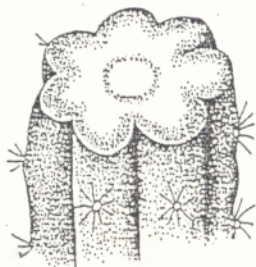
- (a) Cutting the top off a fairly spineless pad of *Opuntia ficus-indica*.



- (b) Cutting away the epidermis at an angle of the stock plant. (The same is done to the scion, before putting it onto the *Opuntia*).

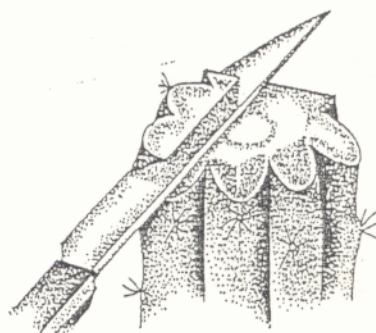


- (c) One toothpick is inserted through the *Opuntia* pad. The scion is then placed in position and held in place by a rubber band, which is placed over the scion and hooked on to each end of the toothpick. If there is a tendency for the scion to slide around, this can be prevented by pinning it to the *Opuntia* stock with one or more cactus spines.

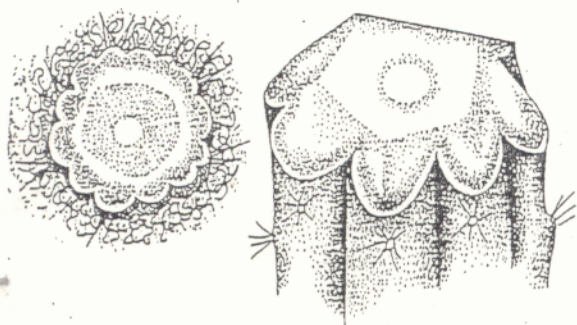


USING A TRICHOCEREUS PLANT

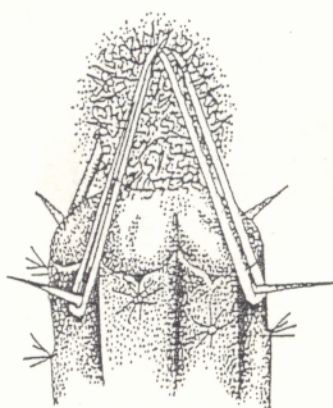
- (a) Top of *Trichocereus* having cut the tip off.



- (b) Top of *Trichocereus* having cut the epidermis away at an angle.



- (c) Base of scion (left), and top of *Trichocereus* showing that the epidermis has been cut away from both. Note the vascular ring of the *Trichocereus*.



- (d) Scion in place, slightly to one side, to ensure that it is over part of the vascular ring.

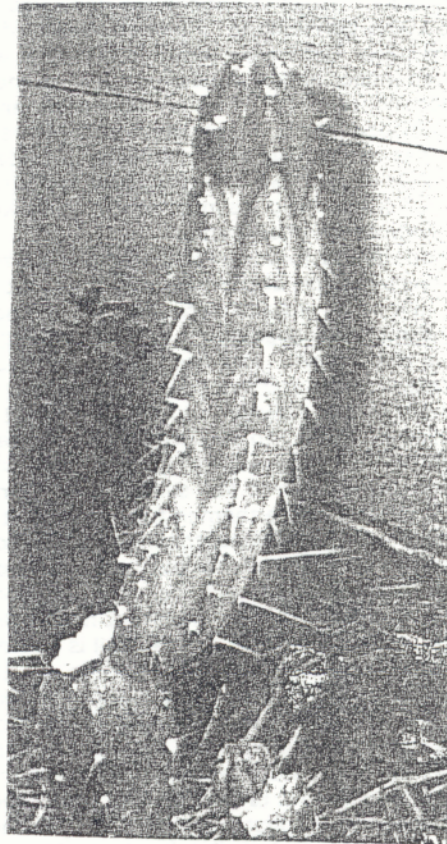
Growing Lophophora And Trichocereus Cactus From Seeds by Anonymous

Growing Lophophora and Trichocereus cacti from seeds is a bit tricky. Don't become discouraged if you make some mistakes and lose some plants in the learning process. The key to success is to pay attention to what works and avoid what doesn't. Everyone is going to have a different growing environment, therefore is it difficult to make exact trouble shooting recommendations. If you try to stick to the procedures outlined in this report, you will have a better chance of understanding what to do if problems develop.

If you are growing cacti in kits purchased from Wildflowers of Heaven, you need not concern yourself with the supplies needed or soil preparation, as everything is included in the kit.

If you have not purchased the kit, you will need the following: a glass or steel tray approximately 9"x14" and 2" deep, a glass or plastic cover or lid, and a proper soil mix. If you are growing Trichocereus varieties, a steel tray is best, as tiny puncture holes can be easily made and are needed for good drainage. It's best to make 20-25 holes of no more than 1/32 inch in diameter. That way a finely sifted sand and soil mix will not fall through the holes. Cover with a sheet of glass, or, if steel cake pans are used, cover with the tight fitting transparent lids that come with these. Make tiny holes in the bottoms of the cake pans, as mentioned above.

The correct soil mix is important in order to avoid bacterial problems which can kill seedlings. Rarely will one ever need to resort to chemicals to prevent soil pests from occurring, if healthy soil is used from the start. Healthy plants are produced from healthy soil and are naturally immune to pests and bacteriological problems. Loamy soil types are the very best. If using a soil with a pH of 7.0, mix in 33% to 50% sand and the balance in soil. However, cacti are hardy and can thrive in a variety of soil types. It is most important that the soil contain sufficient sand for good drainage. Poorly drained soil can cause root rot. Lime is an important soil nutrient for growing Lophophora varieties. Most soils with a pH of 6.5 or above have sufficient lime. If lime is needed, it should be in the form of bone meal or rock phosphate. Never use animal waste to increase pH levels. Even composted, these have fast acting nitrogen fixers which will burn cacti seedlings. You can gather good, black, loamy soil from underneath oak or pine trees, (the soil under the mulch layers), or from rich creek bed banks where an abundance of plant life indicates good soil. Often these soil types will be naturally high in sand. If you are in an area where cacti grows wild, you can gather soil directly from these areas. This soil will be perfectly balanced for cacti, all you need to do is add the water. If soil gathering is inconvenient, you can purchase soil suitable for growing cacti at most garden centers. However, renowned cacti expert Brian Lamb writes that most available cactus soils are often lacking superior loam. Merely adding 5% to 10% composted table scraps, or that much in peat moss, will give soil more loam. If you add anything to commercial soil, or if you gather your own, be sure to sift all materials through a fine screen. This will prevent clods from forming, which can hinder seedlings. Do not be alarmed if you see a green moss developing on the soil. It does not kill or harm the seedlings and can remain there until the plants are placed in permanent pots. While some commercial growers say that sterilizing soil is essential to destroy harmful microorganisms, others indicate that the sterilizing of soil destroys healthy microorganisms and should be avoided. It really does not seem to make a difference because soil microorganisms return to



Trichocereus bridgesii: This cacti, along with *T. pachanoi*, was known by the Incas as San Pedro the sacred visionary cactuses.

sterilized soil within 6 to 8 weeks after being reconstituted with water.

Sterilizing soil does kill dormant weeds, however, and is therefore recommended. A non-chemical sterilized soil is the very best for cacti cultivation from seed. It is prepared as follows: Allow your sifted soil to dry 100%. This can be done on an extra large cookie sheet in the oven or on top of a wood stove. Once the soil is completely dry, heat to 140 degrees F., keeping soil from cooling for five minutes. Remove from oven or heat source. Allow to cool. Sterilized soil is now ready. Soil purchased in W.O.H.'s cacti growing kits is all heat sterilized.

To begin planting, fill your growing trays about one inch deep with your prepared soil and spread it out smoothly and evenly. All watering for Lophophora varieties is best done with a good quality spray bottle to avoid possible over watering. Distilled water is best because it prevents mineral build up, which can lead to unbalanced pH levels. Watering of Trichocereus varieties can be done with any low stream waterer because these require up to ten times more water than Lophophora varieties. Be careful that the stream is dispensed gently to prevent soil movement. Once the soil is laid out and ready, begin spraying with water. For Lophophoras, spray the surface until it is good and damp, not soggy. For Trichocereus, saturate the entire soil, but again it should not be soggy. Once the soil is just right, the seeds should be placed on the surface, about one inch apart. After the seeds are in the tray, cover with $\frac{1}{4}$ to $\frac{1}{2}$ inch prepared cactus soil. Do not press this cover soil down. Water it with a spray bottle. After a few waterings it will settle and compress uniformly by itself. The lid can now be placed over the tray. The glass or plastic cover lets light in and holds moisture in at a constant level.

Light and warmth are the next important factors to get right. Seedlings germinate best at temperatures between 75 and 90 degrees F. Temperatures above this can kill and those below will result in poor germination. When conditions are right, you can expect to see germination in 5 to 14 days, with around 90 to 100% germinating. However, seeds of Echinocereus Triglochidiatus often require up to 6 weeks to germinate. Cacti grow best and fastest in warm temperatures such as those mentioned above. In winter, when indoor temperatures may drop to the low 40's, seedling growth stops. But there is little danger of Lophophora dying. They are both cold hardy and drought tolerant. A six month old seedling is cold hardy to 20 degrees F., if cultivated outdoors year round. However, Trichocereus seedlings are less cold hardy. They can survive over the winter provided they stay 45 to 60 degrees F, and are 6 to 9 months old. Year round heated greenhouses are best, but don't let this lack of a growing environment discourage you. If you have a sunny, south facing window with five or more hours of direct light daily, you have a good chance of success.

A good method for regulating light and warmth is to make a shade cloth constructed of a wooden frame about twice the size of the tray, with legs that stand around all four corners, with a hemp or muslin cloth stapled to it. This will allow enough light and heat to reach the plants without overheating or burning. Almost all cacti species will do best growing in total shade for the first 12 to 18 months, as provided for in this manner. Non seedlings will thrive best in what is termed "partial sun", (4 to 6 hours of direct light daily). When you feel your seedlings are mature enough to be exposed to direct light, begin by locating them so that they can receive only 1 or 2 hours of direct light daily (DLD) for 5 to 7 days. Then begin allowing them 3 to 4 hours DLD for the same number of days. At this point if no sun shock has occurred, it is safe to allow them up to 6 hours DLD. In the winter when light intensity is low, it is probably safe to leave them in "full sun" all day. During spring through early fall, when it can get very hot, it might be best to place them in full shade or at least partial shade to prevent burning. Everyone will have different growing conditions, therefore it is difficult to make hard and fast rules. Overexposure to direct light causes shriveling and/or burning. (Solution? Decrease light.) Overexposure to shade causes plants to become spindly and weak looking. (Solution? Increase light.)

Regular watering is very important for the first year. Lophophoras can be watered freely late spring through early fall, so long as their soil is well drained and temperatures are warm enough to allow them to dry back quickly. If allowed to get too dry, they will begin to look shriveled. Good watering of the surface soil will bring them around in a day or two. Trichocereus will start getting brownish red if they are not receiving adequate water. As long as you are using a well drained, sandy soil, there is little chance of over watering during warm months. Be careful to water moderately in winter, as the cool conditions may cause moisture retention and result in root rot. This is true for Lophophoras as well. With Trichocereus, you may want to take a small tipped tool and dig a tiny hole in the soil to see how deep the moisture has gone. In the first few months of growing, if the soil is dry more than $\frac{1}{16}$ inch in depth, add water. After the plants are $\frac{1}{2}$ inch tall, you could wait till they have dried back $\frac{1}{4}$ to $\frac{1}{2}$ inch.

Transplanting works best using a small spoon. Take care not to disturb the roots and the soil immediately adjacent. The soil tends to cling to the roots, so there is little chance of failure in this. Once they are transplanted and begin living in partial sun, the soil can be allowed to dry out completely at times. However, they will grow best receiving regular waterings whenever their soil is dry. At this stage they are much tougher than seedlings.

For other slow growing cacti, such as Echinocereus, Coryphanthas, etc., follow instructions for Lophophora. For cultivating faster growing, columnar varieties, follow instructions for Trichocereus.

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